

	<p style="text-align: center;">Snap-on Tools</p> <p style="text-align: center;">Recycling a Rinsewater Stream Using Ultrafiltration and Ion Exchange</p>
Standard Industrial Classification (SIC)	Sheet Metal Fabrication/3444
Process	Electrodeposition of water based paints.
Type of Waste	Ethylene glycol monobutyl ether (butyl cellusolve)
Strategies	Process Modification - Ion Exchange Column Installation
Background	<p>Snap-on Tools is a hand tool and tool storage rollaway manufacturer headquartered in Kenosha, Wisconsin. Snap-on employs over 1,300 in its Wisconsin operations and has gross revenues in excess of \$900 million.</p> <p>Snap-on uses an electrocoating paint line with water based coatings. Snap-on Tools uses ultrafiltration to recover process paint from the rinse tanks' effluent. The ultrafiltration process produces concentrated paint for return to the paint bath, and permeate which is recycled to the rinse baths.</p> <p>The permeate composition is 97% water with 2-3% ethylene glycol monobutyl ether (butyl cellusolve) and a contaminant isopropyl amine present in amounts less than 1%. The recycle loop to the rinse could not be totally closed because the contaminant isopropyl amine would build up in the system and ruin the rinse bath.</p> <p>To prevent the build up of isopropyl amine, a purge stream was split from the recycle stream and drained to the Publicly-Owned Treatment Works (POTW). In 1989, Snap-on reported sewerage over 190,000 pounds of the butyl cellusolve. The local POTW had no difficulty handling the extra strength wastewater loading.</p>
Motivation	Snap-on Tools places a substantial value on its image as a good corporate citizen. As a result, Snap-on felt uncomfortable discharging the large amount of butyl cellusolve to the local POTW. The company felt that their disclosure of the discharge in SARA Title III reporting would taint their corporate image.
Changes Implemented	<p>Snap-on Tools decided to recover the 190,000 pounds of butyl cellusolve that was lost in the purge of the recycle stream and discharged to the POTW. Snap-on Tools needed a method of removing the contaminant isopropyl amine from the purge stream. Snap-on identified ion exchange as the most attractive means of removing isopropyl amine.</p> <p>A two stage ion exchange resin system was installed to remove the isopropyl amine from the purge stream. The permeate from the ion exchange system (water and butyl cellusolve) can now returned to the</p>

	<p>rinse baths. The isopropyl amine that is trapped by the resin is stripped during the regeneration of the resin and is sewerred.</p> <p>The ion exchange system has been very successful in removing the isopropyl amine. Only 3,500 pounds per year of butyl celluslove must now be purged and discharged to the POTW. Snap-on Tools now saves \$54,900/year due to butyl cellusolve recovery, and at least \$18,000/year on sewer fees.</p>
<i>Problems Encountered</i>	<p>It was critical that the ion exchange system be effective in removing isopropyl amine because the build up of the contaminant in the rinsewater could degrade the quality of the electocoating finish. Closing the wastewater loop entirely was contingent on complete removal of isopropyl amine.</p>
<i>Material/Energy Balance</i>	<p><i>Original Process</i></p> <p>Feedstock Butyl cellusolve in rinse water</p> <p>Waste Butyl cellusolve in wastewater - 190,000 lbs (1989)</p> <p>Disposal Discharged to POTW</p> <p><i>Pollution Prevention Approach</i></p> <p>Feedstock Butyl cellusolve in rinse water</p> <p>Waste</p>
<i>Economics</i>	<p>Capital Cost \$150,000 (1989)</p> <p>Operating/Maintenance Cost Not available</p> <p>Payback Period Payback of 2 years based on total savings of \$72,900/year from butyl cellusolve recovery (\$54,900/yr.) and sewer fee savings (\$18,000/yr.)</p>
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<i>Pollution Prevention Resources</i>	<p>University of Wisconsin Extension Solid and Hazardous Waste Education Center Milwaukee area: 414/475-2845</p>

Remainder of state: 608/262-0385

Pollution Prevention Information Clearinghouse

Wisconsin Department of Natural Resources

Cooperative Environmental Assistance

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